



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/042,475	01/09/2002	Kenneth E. Dahlberg	PM 98.086	6077

7590 08/09/2005

Keith A. Bell
ExxonMobil Upstream Research Company
P.O. Box 2189
Houston, TX 77252-2189

EXAMINER

ALHIJA, SAIF A

ART UNIT	PAPER NUMBER
----------	--------------

2128

DATE MAILED: 08/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/042,475

Applicant(s)

DAHLBERG, KENNETH E.

Examiner

Saif A. Alhija

Art Unit

2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 25 Nov 11 June '02.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Art Unit: 2128

Detailed Action

1. Claims 1-12 have been presented for examination based on the application filed on 9 January 2002.

Information Disclosure Statement

2. The information disclosure statement filed 11 June 2002 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

The non-patent literature publication, "The Rock Physics Handbook, Tools for Seismic Analysis in Porous Media", Mavco, G., Mukerji, T., and Dvorkin, J. 1998, Cambridge University Press, was not submitted.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2128

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. **Claim(s) 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Srnka "Remote Reservoir Resistivity Mapping" U.S. Patent # 6,603,313 in view of Tabanou et al. "Method and Apparatus for Detecting and Quantifying Hydrocarbon Bearing Laminated Reservoirs on a Workstation" U.S. Patent # 5,461,562**

Regarding Claim 1:

Srnka discloses a method of analyzing data obtained from well logs taken in a subsurface geological to determine an expected value of the hydrocarbon pore volume of the formation, comprising:

(a) defining an initial model of the subsurface formation based upon estimates of different bed types and bed-type parameters in the formation, one of said bed-type parameters being aspect ratio, the initial model including a system of log equations for predicting well logs from bed-type parameters; (**Srnka, '313** , Column 11, Lines 33-36, 42-45. Column 13, Lines 48-53)

Art Unit: 2128

(b) performing a Monte Carlo inversion to find the ranges of bed-type parameters consistent with the measured well log data; (**Srnka**, '313 , Column 11, Lines 66-67. Column 12, Lines 1-3)

(c) determining a statistical distribution for hydrocarbon pore volume representing the expected value for and an uncertainty in the hydrocarbon pore volume from said Monte Carlo inversion. (**Srnka**, '313 , Column 11, Lines 66-67. Column 12, Lines 1-3. Column 16, Lines 19-21)

Srnka does not disclose a method of analyzing data obtained from well logs taken in a subsurface geological formation having thinly interbedded sandstone and shale layers. However, **Tabanou et al.**, refers to a geological formation having thinly interbedded sandstone and shale layers (**Tabanou et al.**, '562, Column 7, Lines 66-67)

It would therefore have been obvious to a person of ordinary skill in the art to use the analysis method disclosed in **Srnka** in order to analyze the geological formations discussed in **Tabanou et al.** in order to determine hydrocarbon pore volume in alternative geological formations.

Regarding Claim 2:

Srnka discloses the method of claim 1 wherein at least one of said bed types has a finite lateral extent and a positive aspect ratio. (Column 13, Lines 17-20, 47-53)

Art Unit: 2128

It would therefore have been obvious to a person of ordinary skill in the art to utilize a finite lateral extent and positive aspect ratio as discussed in **Srnka** in order to determine hydrocarbon pore volume in geological formations.

Regarding Claim 3:

Srnka discloses The method of claim 1 wherein the step of defining the initial subsurface formation model comprises:

- (a) selecting an analysis interval; (**Srnka**, '313 , Column 13, lines 4-8)
- (b) obtaining average values of the measured well log data over the analysis interval; (**Srnka**, '313 , Column 13, Lines 12-14)
- (f) computing log responses for each bed type and over the composite analysis interval (**Srnka**, '313 , Column 11, Lines 43-45);

Srnka does not disclose step (c) formulating a set of reservoir and non-reservoir bed types constituting the selected analysis interval. However, **Tabanou et al.**, refers to a geological formation having thinly interbedded sandstone and shale layers (**Tabanou et al.**, '562, Column 7, Lines 66-67) with sandstone being reservoir and shale being non-reservoir types.

Srnka does not disclose step (d) determining average values of the petrophysical parameters for each bed type. However, **Tabanou et al.**, refers to petrophysical assumptions for thin bed interpretations (**Tabanou et al.**, '562, Column 2, Lines 14-17).

Srnka does not disclose step (e) assigning relative frequency of occurrence of the different bed types in the formation. However, **Tabanou et al.**,

Art Unit: 2128

refers to a multitude of shale laminations interleaved with sand laminations (Tabanou et al., '562, Column 7, Lines 66-67).

Srnka does not disclose step (g) comparing the computed log responses to the measured log data for consistency. However, **Tabanou et al.**, refers to comparator to determine if further refinement is needed (**Tabanou et al.**, '562, Figure 8, Comparator (Refinement), Element # 20b1d).

Srnka does not disclose step (h) repeating steps (b) to (g) until the model parameters are consistent with the measured log data. However, **Tabanou et al.**, refers to a step to determine if further refinement is needed and to repeat the previous steps as a result (**Tabanou et al.**, '562, Figure 8, "Is Further Refinement Needed?", Element # 20b1e)

It would therefore have been obvious to a person of ordinary skill in the art to use the analysis steps disclosed in **Srnka** in order to augment the analysis steps discussed in **Tabanou et al.** in order to define the initial subsurface formation model in order to facilitate the modeling of a geological formation for the purposes of hydrocarbon analysis.

Regarding Claim 4:

Srnka discloses the method of claim 1 wherein the step of performing the Monte Carlo inversion comprises:

Srnka does not disclose step (a) estimating uncertainty ranges for each bed-type parameter and for bed frequencies. However, **Tabanou et al.**, refers to

Art Unit: 2128

statistical uncertainty inherent in the Monte Carlo method. (**Tabanou et al.**, '562, Column 19, Lines 46-47).

(b) generating a random model consisting of random variants for each bed-type parameter and frequency; . (**Srnka**, '313 , Column 11, Lines 66-67. The Monte Carlo method is used to simulate random processes).

(c) computing estimates of average log responses over an analysis interval of the model; (**Srnka**, '313 , Column 11, Lines 43-45);

Srnka does not disclose step (d) comparing the computed log responses to the measured log data for consistency. However, **Tabanou et al.**, refers to comparator to determine if further refinement is needed (**Tabanou et al.**, '562, Figure 8, Comparator (Refinement), Element # 20b1d).

Srnka does not disclose step (e) retaining the model only if estimated log responses are consistent with measured log responses; However, **Tabanou et al.**, refers to comparator to determine if further refinement is needed (**Tabanou et al.**, '562, Figure 8, Comparator (Refinement), Element # 20b1d).

Srnka does not disclose step (f) repeating steps (a) to (e) until a specified number of trials has been completed. However, it would have been obvious to a person of ordinary skill in the art to repeat the stated steps in order to obtain an accurate resultant.

(g) computing distribution statistics for interval hydrocarbon pore volume and related parameters. (**Srnka**, '313 , Column 11, Lines 66-67. Column 12, Lines 1-3. Column 16, Lines 19-21)

Art Unit: 2128

It would therefore have been obvious to a person of ordinary skill in the art to use the analysis steps disclosed in **Srnka** in order to augment the analysis steps discussed in **Tabanou et al.** in order to define the initial subsurface formation model in order to facilitate the Monte Carlo calculations for the purposes of hydrocarbon analysis.

Regarding Claim 5:

Srnka does not disclose the method of claim 1 wherein the step of performing the Monte Carlo inversion includes estimating uncertainties for the formation bed properties and for the volume fractions. However, **Tabanou et al.**, refers to statistical uncertainty inherent in the Monte Carlo method. (**Tabanou et al.**, '562, Column 19, Lines 46-47).

It would therefore have been obvious to a person of ordinary skill in the art to use the Monte Carlo method discussed in **Srnka** as well as including the statistical uncertainty inherent in the method as discussed in **Tabanou et al.**

Regarding Claim 6:

Srnka discloses the method claim 1 wherein the step of performing a Monte Carlo inversion is carried out using a programmed digital computer. (Column 16, Lines 38-42)

Regarding Claim 7:

Art Unit: 2128

Srnka discloses the method of claim 1 wherein the formation model has inputs which comprise a set of parameters describing the thinly bedded formation (**Srnka**, '313 , Column 5, Lines 32-34) and has outputs which are the average water saturation, and average hydrocarbon pore volume.

Srnka does not disclose the outputs of average porosity and sand fraction. However, **Tabanou et al.**, refers to the output of sand fraction as well as porosity (**Tabanou et al.**, '562, Column 1, Lines 26-27. Column 2, Lines 37-38).

It would therefore have been obvious to a person of ordinary skill in the art to derive the formation properties discussed in **Srnka** as well as including the formation properties discussed in **Tabanou et al.** in order to obtain the properties of the formation model.

Regarding Claim 8:

Srnka discloses the method of claim 7 wherein the accuracy of the input parameters of the formation model are described in terms of probability distributions of parameter values and wherein the step of performing a Monte Carlo inversion involves making a plurality of cases wherein each case comprises a random selection of a parameter value for each input parameter from the probability distribution and calculating a set of outputs. (**Srnka**, '313 , Column 11, Lines 66-67.)

It would therefore have been obvious to a person of ordinary skill in the art to describe the parameter values and randomness in utilizing the Monte Carlo

Art Unit: 2128

method, as discussed in **Srnka**, which is itself a stochastic technique based on the use of random numbers and probability statistics.

Regarding Claim 9:

Srnka does not disclose the method of claim 8 wherein the step of performing a Monte Carlo inversion is made using a spreadsheet programmed in a digital computer and wherein each case involves a recalculation of the spreadsheet to obtain a resultant set of outputs. However, **Tabanou et al.**, refers to the use of ELAN software, which utilizes spreadsheets with respect to volumetric analysis. (**Tabanou et al.**, '562, Column 4, Lines 48-50).

It would therefore have been obvious to a person of ordinary skill in the art to perform the Monte Carlo inversion as discussed in **Srnka**, utilizing spreadsheet software discussed in **Tabanou et al.** as well as performing further recalculations utilizing the spreadsheet to obtain a desired resultant.

Regarding Claim 10:

Srnka and Tabanou et al. do not disclose the method of claim 9 wherein the step of performing a Monte Carlo inversion involves making at least one thousand cases and each resultant set of outputs comprises calculated log responses.

However, it would have been obvious to a person of ordinary skill in the art to repeat the Monte Carlo inversion utilized in **Srnka and Tabanou et al.** in order to obtain an accurate resultant.

Regarding Claim 11:

Srnka does not disclose the method of claim 10 wherein the resultant set of outputs from each case is retained only if that case produces a set of calculated log response outputs which correspond to the input log values within a specified closeness of fit. However, **Tabanou et al.**, refers to comparator to determine if further refinement is needed of the output data (**Tabanou et al.**, '562, Figure 8, Comparator (Refinement), Element # 20b1d).

It would therefore have been obvious to a person of ordinary skill in the art to use the calculation resultants discussed in **Srnka and Tabanou et al.** as well as comparing the data to determine if further refinement is needed as discussed in **Tabanou et al.** in order to obtain an accurate resultant.

Regarding Claim 12:

Srnka does not disclose the method of claim 11 further comprising the step of storing the retained sets of outputs and analyzing them for a determination of uncertainty in the estimate of hydrocarbon pore volume. However, **Tabanou et al.**, refers to statistical uncertainty inherent in the Monte Carlo method. (**Tabanou et al.**, '562, Column 19, Lines 46-47).

It would therefore have been obvious to a person of ordinary skill in the art to use the Monte Carlo method discussed in **Srnka** as well as regarding the statistical uncertainty inherent in the method as discussed in **Tabanou et al.** and to further store and analyze the data in order to obtain an accurate resultant.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. These references include:

A) "The Analysis of Some Unsolved Induction Interpretation Problems using Computer Modeling" Barbara Anderson. SPWLA 27th Annual Logging Symposium, June 9-13 1986.

B) "Applications of NMR Measurements for Petrophysical Evaluation of Low-Resistivity Pay Zones". Gary M. Ostroff and David S. Shorey. 2000 Canadian Society of Exploratory Geophysicists Conference . May 31st 2000.

C) "Predictive Modeling of Naturally Fractured Reservoirs using Geomechanics and Flow Simulation" Stephen Bourne et al. Society of Petroleum Engineers 87253. October 2000.

D) "Evaluation of Laminated Formations Using Nuclear Magnetic Resonance and Resistivity Anisotropy Measurements" Frank Shray et al. Society of Petroleum Engineers Eastern Regional Meeting # 72370. October 2001.

5. All Claims are rejected.

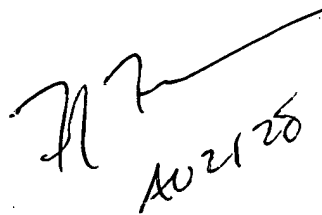
Art Unit: 2128

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Saif A. Alhija whose telephone number is (571) 272-8635. The examiner can normally be reached on M-F, 11:00-7:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jean Homere can be reached on (571) 272-3780. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

August 4, 2005

A handwritten signature, possibly reading "JH", is written above the date "Aug 21 2005".